

Application No. 10/675,885
Reply to Office Action of July 20, 2007

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Docket No.: 59958(70301)

REMARKS

In the Office Action dated July 20, 2007, claims 12-24 are pending, claims 16-24 are withdrawn from consideration and claims 12-15 are rejected. Applicants request reconsideration at least for the reasons discussed hereinbelow.

The present invention is directed to a device for the layer-by-layer manufacture of a three-dimensional object by means of selective hardening at those sites of a layer of a building material that correspond to the cross-section of the object through the use of a laser, the device comprising:

a laser that provides radiation; and

a focusing unit that focuses the radiation to provide a focused beam;

wherein the laser comprises a switching element for changing the modal composition of the laser radiation which switches the modal composition of the emitted laser radiation between a first setting in which a fundamental Gauss mode is emitted and higher order modes are suppressed and a second setting in which the radiation contains additional higher order modes and the overall power of the radiation is increased.

Claims 12 - 15 are rejected under 35 U.S.C. §103(a) over Serbin, et al. (US 5,753,171; "Serbin") in view of Friesem, et al. (US 6,850,544; "Friesem"). Serbin discloses a variable focusing device for changing the area of focus of the laser. The Examiner contends that it would have been obvious to include a mode control element of Friesem in the device of Serbin for the purpose of being able to control and switch a multimode laser beam such that a well-defined controlled phase in which the Gauss mode is utilized to selectively harden a single spot and subsequently go to another mode in which a set of modes is used to thereby increase radiation power and obtain a high level of utilization of the gain medium diameter and thus harden a larger area in a smaller amount of time.

Applicant strongly disagrees.. The present claim recites both a focusing unit and a laser with a switching element. In the present invention, the switching element is used to change the area of focus and irradiation energy with the result that larger, less precise, areas can be hardened in less time. However, Serbin accomplishes this with a variable focusing device (see

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FIG. 3). Why would one of ordinary skill in the art consider to add a switching device to the laser of Serbin? There is no reason for one of ordinary skill in the art to believe such addition is necessary or useful. Thus, even if Friesem disclosed a switching element, it is not seen how one of ordinary skill in the art would have combined Serbin and Friesem.

Further, if one of ordinary skill in the art were to substitute the alleged switching device of Friesem for the variable focusing device of Serbin, that would eliminate the focusing device in Serbin. Thus, the modified device, as proposed by the Examiner, would not have both a focusing unit and a laser with a switching element, as presently claimed.

In addition, as discussed previously, Friesem fails to teach or suggest a laser with a switching element. Instead, in Friesem, a polarizing unit separates two orthogonal polarizations of beams such that each beam has a separate path inside the resonator. Also, there is a common path in the resonator for the two polarizations. In each of the separate paths the mode structure is controlled. Gain utilized by one of the beams is no longer available to the other beam. The two beams have a stable co-existence when the mode control elements are properly designed and axially aligned. Thus, perturbation of one mode on the other is minimal. The two modes co-exist in equilibrium complementing each other and use a larger gain volume than a single mode. [Col. 2, line 65 - col. 3, line 59]

Further, the two beams can be recombined (col. 8, lines 7-19).

However, nowhere in Friesem is there any suggestion for a switching element to switch the laser from one mode to another mode. The whole purpose of splitting the beam and using two paths with different mode controlling elements is to obtain a beam with higher brightness utilizing a greater volume of the gain medium.

Thus, it is not seen how the presently claimed invention would have been obvious to one of ordinary skill in the art in view of any combination of Serbin and Friesem.

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If for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit Account No. 04-1105.

In view of the discussion amendment, Applicant respectfully submits that the pending application is in condition for allowance, an early reconsideration and notice of allowance are earnestly solicited.

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Respectfully submitted,

By

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